PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2003-065071
(43)Date of publication of application : 05.03.2003

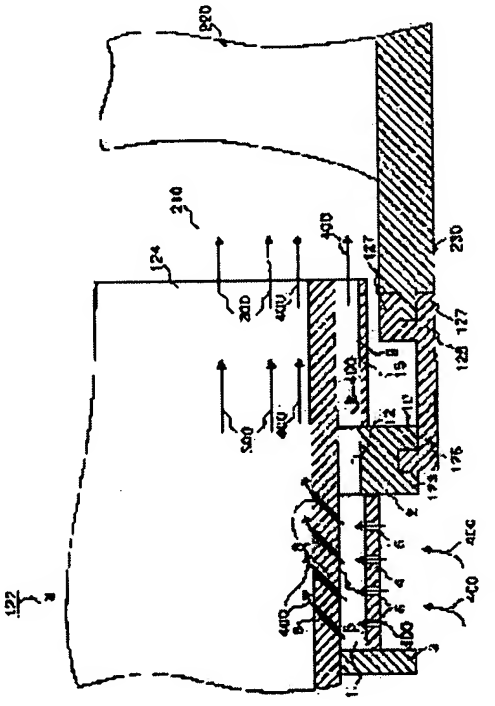
(51)Int.Cl. F02C 7/18
F23R 3/42

(21)Application number : 2001-256965
(22)Date of filing : 27.08.2001

(71)Applicant : MITSUBISHI HEAVY IND LTD
(72)Inventor : ISHIGURO TATSUO
TERASAKI MASAO
SATO YOICHI

(54) GAS TURBINE COMBUSTOR

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a gas turbine combustor in which its outlet can simply and effectively be cooled and thus, the burnout or thermal deformation thereof can be suppressed effectively.
SOLUTION: An impingement cooling means having a plurality of impingement holes 6 is installed on the outer periphery of a combustor outlet 122, and the cooling air 400 compressed by a compressor is jetted from the impingement holes 6 toward the outer peripheral wall face of the combustor outlet 122 to collide therewith, thus performing an impingement cooling. Further, a plurality of film cooling holes 8 are installed on the wall 7 of the combustor outlet 122, and the cooling air 400 after impingement cooling is taken from the film cooling holes 8 into the inside of the outlet 122 to be blown out on its inner wall face, thus performing a film cooling of the outlet 122.



LEGAL STATUS
[Date of request for examination] 23.03.2004
[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention cools the combustor outlet of a gas turbine simply and effectively, and relates to the gas turbine combustor which can inhibit that burning and heat deformation effectively.
[0002]
[Description of the Prior Art] Since the wall surface of a gas turbine combustor serves as passage of the hot combustion gas which reaches the combustion path of a turbine, damaging the wall surface of a combustor by fire by combustion gas, or carrying out heat deformation is known. Drawing 10 is the whole block diagram showing the conventional gas turbine combustor. In this drawing, the gas turbine combustor 100 is constituted including the container liner 110 of the shape of a cylindrical shape which consists of a metal member, and the tail pipe 120 inserted in the opening 111 of this container liner 110. This tail pipe 120 consists of the metal member which has the shape of a cylindrical shape, and inserts and inserts the opening 111 of a container liner 110 in that inlet-port section 121. A tail pipe 120 narrows the cross section gradually from the inlet-port section 121, and the outlet section 122 has the shape of a rectangle which curved in the sector (refer to drawing 11). The outlet section 122 of this tail pipe 120 has the annular seal supporter 123 which has a concave cross-section configuration on that periphery. This seal supporter 123 consists of a metal member, is inserted in the outlet section 122 of a tail pipe 120, and fixed installation is carried out by welding. In addition, the outlet section 122 of the tail pipe 120 said here shall not point out only the opening 124 of a tail pipe 120, and shall also contain the part which burning and heat deformation of the upstream neighborhood produce.
[0003] Drawing 12 is the expanded sectional view showing near the outlet of the gas turbine combustor 100. In this drawing, the gas turbine combustor 100 is connected and installed in the combustion path 210 of a turbine 200 in the outlet section 122 of the tail pipe 120. The inlet port of this combustion path 210 is formed of the inside shroud 230 and the outside shroud 240 which support the 1 step of turbine stationary blade 220 from those both ends. It is being fixed to the vehicle room (illustration abbreviation), a tail pipe 120 being located in the inlet port of this combustion path 210 in that outlet section 122. While the clearance between the outlet section 122 of this tail pipe 120 and the combustion path 210 of a turbine 200 consists of a metallic material, the closure of it is carried out by the annular seal member 125 which has a y character mold cross-section configuration. This seal member 125 is inserted in the crevice of the seal supporter 123 with which the outlet section 122 of a tail pipe 120 is equipped with the point 126 of the

shape of that key, inserts those two crotches 127 in the shrouds 230 and 240 of the 1 step of turbine stationary blade 220, and is installed. In this gas turbine combustor 100, the premixed air generated and lit with the container liner 110 blows off to the combustion chamber 128 of a tail pipe 120, burns, and serves as hot combustion gas 300. This combustion gas 300 progresses the inside of a tail pipe 120, and blows off from that outlet section 122 to the combustion path 210 of a turbine 200.

[0004]

[Problem(s) to be Solved by the Invention] Thus, since that cross section is gradually narrowed as the tail pipe 120 of the gas turbine combustor 100 serves as passage of hot combustion gas 300 and it results in that outlet section 122, combustion gas 300 speeds up the rate of flow most in this outlet section 122. Therefore, especially the outlet section 122 of a tail pipe 120 has the description of heat-deformation-being easy to make burning easy for this combustion gas 300 to receive. Drawing 13 is the front view of the outlet section 122 of the tail pipe 120 in which the situation of the heat deformation was shown. In this drawing, the outlet section 122 of a tail pipe 120 has the shape of a rectangle which curved in the sector in the state of the basis (refer to drawing (a)). However, if it is used over a long period of time and exposed to combustion gas 300, the outlet section 122 of a tail pipe 120 will deform according to the high temperature (refer to drawing (b)). In the gas turbine of for example, a class, the signs appear gradually by about about one year of use 1250 degrees, and, as for heat deformation of this outlet section 122, heat deformation progresses accelarative after that. Consequently, there was a trouble that the tail pipe 120 whole had to be exchanged periodically. However, in the conventional gas turbine combustor 100, since it did not have at all a means to inhibit burning produced in the above tail pipes 120, and heat deformation, development of an effective means to solve this problem was desired strongly.

[0005] Then, this invention is made in view of the above, cools the combustor outlet of a gas turbine simply and effectively, and aims at offering the gas turbine combustor which can inhibit that burning and heat deformation effectively.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the gas turbine combustor which is this invention While being prepared in the combustion path of a turbine at the periphery of the combustor outlet which blows off combustion gas While being prepared in an in PINJI cooling means to have two or more in PINJI holes which it blows off [holes] on the periphery wall surface of said combustor outlet, and make the cooling air compressed with the compressor collide with it, and the wall of said combustor outlet The cooling air after said in PINJI cooling is incorporated inside said combustor outlet, and it blows off, and is characterized by including a film-cooling means to have two or more film cooling holes which form the film of cooling air on the inner circle wall side of said combustor outlet.

[0007] In this invention, with the in PINJI cooling means formed in the combustor periphery, cooling air blows off on the periphery wall surface of a combustor outlet, collides, and carries out in PINJI cooling of the combustor outlet. And with the film-cooling means formed in the wall of a combustor outlet, the cooling air after in PINJI cooling blows off to the inner skin of a combustor outlet, forms the film of cooling air there, and carries out film cooling of the inner skin of a combustor outlet. Thereby, the combustor outlet of a gas turbine is cooled and the burning and heat deformation are

inhibited. In addition, a combustor outlet is formed with the components with which the combustor of a tail pipe and others is equipped.

[0008] Moreover, the gas turbine combustor which is this invention While being prepared in the combustion path of a turbine at the periphery of the combustor outlet which blows off combustion gas While being formed in an in PINJI cooling means to have two or more in PINJI holes which it blows off [holes] on the periphery wall surface of said combustor outlet, and make the cooling air compressed with the compressor collide with it, and the periphery of said combustor outlet It is characterized by including a convection-current cooling means to pass the cooling air after said in PINJI cooling along with the periphery wall surface of said combustor outlet, and to perform convection-current cooling.

[0009] In this invention, with the in PINJI cooling means formed in the combustor periphery, cooling air blows off on the periphery wall surface of a combustor outlet, collides, and carries out in PINJI cooling of the combustor outlet. And with the convection-current cooling means formed in the periphery of a combustor outlet, the cooling air after in PINJI cooling flows along with the periphery wall surface of a combustor outlet, and carries out convection-current cooling of the combustor outlet. Thereby, the combustor outlet of a gas turbine is cooled and the burning and heat deformation are inhibited.

[0010] Moreover, the gas turbine combustor which is this invention While being formed in the combustion path of a turbine at the periphery of the combustor outlet which blows off combustion gas While being prepared in a convection-current cooling means to pass the cooling air compressed with the compressor along with the periphery wall surface of said combustor outlet, and to perform convection-current cooling, and the wall of said combustor outlet The cooling air which flows along with the periphery wall surface of said combustor outlet is incorporated inside said combustor outlet, and it blows off, and is characterized by including a film-cooling means to have two or more film cooling holes which form the film of cooling air on the inner circle wall side of said combustor outlet.

[0011] In this invention, with the convection-current cooling means formed in the periphery of a combustor outlet, cooling air flows along with the periphery wall surface of a combustor outlet, and carries out convection-current cooling of the combustor outlet. Moreover, a part of cooling air which flows along with this periphery wall surface is incorporated inside a combustor from the film cooling hole established in the wall of a combustor outlet, and it blows off on that internal surface, forms the film of cooling air, and carries out film cooling of the combustor outlet. Thereby, the combustor outlet of a gas turbine is cooled and the burning and heat deformation are inhibited.

[0012] Moreover, in a gas turbine combustor according to claim 1, further, the gas turbine combustor which is this invention is characterized by including a convection-current cooling means to pass the cooling air after said in PINJI cooling along with the periphery wall surface of said combustor outlet, and to perform convection-current cooling while it is formed in the periphery of said combustor outlet.

[0013] In this invention, with the convection-current cooling means formed in the periphery of a combustor outlet, the cooling air after in PINJI cooling flows along with the periphery wall surface of a combustor outlet, and carries out convection-current cooling of the combustor outlet. Thereby, as compared with the case where it cools only with an in PINJI cooling means and a film-cooling means, a combustor outlet can be

cooled more effectively.
[0014] Moreover, the gas turbine combustor which is this invention is characterized by said in PINJI cooling means being an in PINJI member which has said in PINJI hole while being installed in the periphery of said combustor outlet in the gas turbine combustor of any one publication of claim 1-4. In this invention, since an in PINJI member is installed in the periphery of a combustor outlet, the cooling air which blew off from that in PINJI hole collides with the periphery wall surface of a combustor outlet, and carries out in PINJI cooling of the combustor outlet. In addition, the member which has the in PINJI hole of annular, tabular, and others is contained in an in PINJI member.
[0015] moreover , in the gas turbine combustor of any one publication of claim 1-5 , the gas turbine combustor which be this invention blow off from the clearance in which the air after said in PINJI cooling or the air after said convection current cooling be formed on the opening outside edge of said combustor outlet , in accordance with the wall of said combustion path further , and be characterize by have the air film means forming which can form the film of cooling air in the front face of this wall . In this invention, the cooling air after convection-current cooling blows off from the clearance between opening outside edges in accordance with the wall of a combustion path, and forms the film of cooling air in the front face of this wall. Thereby, the wall of a combustion path can be cooled.
[0016] Moreover, in the gas turbine combustor of any one publication of claim 1-6, the gas turbine combustor which is this invention is characterized by preparing the air chamber which supplies this accumulated cooling air to said film cooling hole or said cooling air passage while it accumulates the cooling air which blew off from said in PINJI hole, and collided with said periphery wall surface in the periphery of said combustor outlet. In this invention, the cooling air which collided with the periphery wall surface of a combustor outlet collects on an air chamber, and is supplied as a refrigerant of film cooling or convection-current cooling from here. Thereby, cooling air can be used efficiently.
[0017] Moreover, the gas turbine combustor which is this invention is characterized by said convection-current cooling means being a covering member which forms the path of said cooling air on the peripheral face of said combustor outlet, forming a clearance in the opening outside edge of said combustor outlet while it covers the periphery of said combustor outlet and is installed in the gas turbine combustor of any one publication of claim 1-7. In this invention, cooling air carries out convection-current cooling of the peripheral face of a combustor outlet, and blows off from the clearance between the opening outside edges of a combustor outlet to a combustion path further. Thereby, cooling air cools a 1 step of turbine stationary blade as film-cooling air while inhibiting the contamination of the combustion gas produced on the opening outside edge.
[0018] Moreover, the gas turbine combustor which is this invention In the gas turbine combustor of any one publication of claim 1-8 Furthermore, it has two or more in PINJI holes which it blows off [holes] on the periphery wall surface near opening of said combustor outlet, and make said cooling air collide with it. And it is characterized by including the seal member which closes the clearance between said combustion paths and said combustor outlets while being passed and installed in the inlet port of said combustion path from said combustor outlet, covering the periphery of said combustor outlet. In this invention, cooling air blows off from the in PINJI hole of a seal member,

collides with the periphery wall surface of a combustor outlet, and carries out in PINJI cooling of here.

[0019]

[Embodiment of the Invention] Hereafter, it explains to a detail, referring to a drawing per this invention. In addition, this invention is not limited by the gestalt 1 of this operation. Moreover, what can usually carry out the design change of this contractor shall be contained in the component of the gestalt 1 of operation shown below.

[0020] (Gestalt 1 of operation) Drawing 1 is the side-face sectional view showing the important section of the gas turbine combustor concerning this invention which is the gestalt of the 1st operation. In this drawing, the same sign is given to the same component as the above-mentioned conventional gas turbine combustor 100, and the explanation is omitted. The gas turbine combustor 100 is located in the inlet port of the combustion path 210 of a turbine in the opening 124 of the tail pipe 120 outlet section 122. The inlet port of this combustion path 210 arranges the inside shroud 230 and the outside shroud 240 which support the 1 step of turbine stationary blade 220 to abbreviation parallel, and is formed. Among these shrouds 230 and 240, the outlet section 122 of a tail pipe 120 inserts the edge of the opening 124, and is installed. The annular seal supporter 123 which has a concave cross-section configuration is inserted in the outlet section 122 of a tail pipe 120, and fixed installation is carried out by welding on the peripheral face of the outlet section 122. The closure of the outlet section 122 and the combustion path 210 of a tail pipe 120 is carried out in the clearance by the annular seal member 125 which has the y character mold cross-section configuration passed and installed in the seal supporter 123 and shrouds 230 and 240.

[0021] Moreover, a tail pipe 120 has the air chamber 1 of the rectangular section formed in the upstream of the seal supporter 123 by going round the periphery of a tail pipe 120. The air chamber 1 is divided by the in PINJI ring 4 passed and installed in the peripheral face of the tail pipe 120 outlet section 122, the side face 2 of the tail pipe 120 upstream of the seal supporter 123, the wall 3 installed in the upstream of the seal supporter 123 in parallel with the side face 2, and the seal supporter 123 and a wall 3. The wall 3 of an air chamber 1 consists of a metal member, and has the outlet section 122 of a tail pipe 120, and the annular configuration which fits in each other. This wall 3 is inserted in from the outlet section 122 of a tail pipe 120, and fixed installation is carried out by welding on the peripheral face of a tail pipe 120. Moreover, the in PINJI ring 4 consists of a thin metal member, and has the abbreviation telescopic annular configuration of having an abbreviation similarity configuration as the periphery of the tail pipe 120 outlet section 122. It is supported by the upstream side face 2 of the seal supporter 123, and the annular wall 3, the in PINJI ring 4 turning the inner skin 5 in parallel to the peripheral face of a tail pipe 120, and is being fixed to these by welding. Moreover, the in PINJI hole 6 of a large number which turned the exhaust nozzle to the peripheral face of a tail pipe 120 is formed in the in PINJI ring 4 (refer to drawing 2).

welded 4

[0022] Moreover, the film cooling hole 8 of a large number penetrated to the tail pipe 120 interior is formed in the wall 7 of the tail pipe 120 outlet section 122 over the perimeter from the air chamber 1. A film cooling hole 8 is the micropore used as the path of cooling air 400 (refer to drawing 3), and is formed by laser in recent years. Moreover, a tail pipe 120 has the air duct 9 formed in the downstream of the seal supporter 123 along with the peripheral face of the tail pipe 120 outlet section 122 (refer to drawing 4 (a)). The air duct

9 is formed of the telescopic covering member 15 which consists of a thin metal member and has an abbreviation similarity configuration as the outlet section 122 of a tail pipe 120. The covering member 15 is inserted in the periphery of the outlet section 122 of a tail pipe 120, welds the edge to the downstream side face 10 of the seal supporter 123, and is being fixed. Moreover, the edge 11 of the outlet side of the covering member 15 is located in opening 124 and homotopic of the tail pipe 120 outlet section 122, and forms the diffuser of the uniform air duct 9 in the rim perimeter of opening 124. Moreover, the seal supporter 123 has two or more slits in a weld zone with a tail pipe 120 (refer to drawing 4 (b)). This slit 12 is making the air chamber 1 and the air duct 9 open for free passage, and serves as passage of the cooling air 400 from an air chamber 1.

[0023] In the gestalt 1 of this operation, the differential pressure of the tail pipe 120 exterior and the combustion path 210 spouts the cooling air 400 compressed by the compressor (illustration abbreviation) in an air chamber 1 from the in PINJI hole 6 of the in PINJI ring 4. And cooling air 400 collides with the peripheral face of the tail pipe 120 outlet section 122, and carries out in PINJI cooling of this outlet section 122. The cooling air 400 after in PINJI cooling collects in an air chamber 1, and the part blows off from the film cooling hole 8 of a tail pipe 120 to the tail pipe 120 inside, and it forms the film of thin cooling air 400 in the internal surface of a tail pipe 120. Thereby, the wall of a tail pipe 120 is protected from the hot combustion gas 300 which flows the tail pipe 120 interior, and the burning is inhibited. Moreover, a part of other cooling air 400 passes along the slit 12 of the seal supporter 123 from an air chamber 1, and it flows into the air duct 9 of outlet section 124 periphery. This cooling air 400 flows the inside of an air duct 9 along with outlet section 124 periphery, and carries out convection-current cooling of the tail pipe 120 outlet section 122. Furthermore, the cooling air 400 after convection-current cooling blows off from the diffuser of an air duct 9 to the combustion path 210, and carries out film cooling of the 1 step of turbine stationary blade 220.

[0024] According to the gestalt 1 of this operation, since the outlet section 122 of a tail pipe 120 is cooled by cooling air 400 as mentioned above, that burning and heat deformation are inhibited. Moreover, since the cooling air 400 after in PINJI cooling is reused by the air chamber 1 in the next cooling, cooling air 400 can be efficiently used for it, and it can be effectively cooled by the small flow rate. Furthermore, since the cooling air 400 which blew off from the air duct 9 can be used also for cooling of the 1 step of turbine stationary blade 220, cooling air 400 can be more efficiently used for it.

[0025] In addition, in the gestalt 1 of this operation, although the gas turbine combustor 100 cools the tail pipe 120 outlet section 122 by in PINJI cooling, film cooling, and convection-current cooling, it may be alternative. [of film cooling and convection-current cooling] That is, the cooling structure of the tail pipe 120 outlet section 122 is good also as using the cooling air after in PINJI cooling only for film cooling, without forming a slit 12 and an air duct 9, and good also as using the air after in PINJI cooling only for convection-current cooling, without forming a film cooling hole 8 (illustration abbreviation). While being able to cool effectively by thereby more little cooling air 400, it can consider as the simple cooling structure according to burning of the gas turbine combustor 100, or extent of heat deformation. Moreover, only a film cooling hole 8 and an air duct 9 may constitute the above-mentioned cooling structure, without establishing an in PINJI cooling means (refer to drawing 5). Burning of a tail pipe 120 can be inhibited with a thereby more simple configuration.

[0026] (Gestalt 2 of operation) Drawing 6 is the side-face sectional view showing the important section of the gas turbine combustor concerning this invention which is the gestalt of the 2nd operation. In this drawing, the same sign is given to the same component as the gas turbine combustor 100 concerning the gestalt 1 of the above-mentioned former and operation, and the explanation is omitted. The gas turbine combustor 100 is located in the combustion path 210 of a turbine in the outlet section 122 of the tail pipe 120. The turbine combustion path 210 is formed of the inside shroud 230 and the outside shroud 240 which support the 1 step of turbine stationary blade 220. The outlet section 122 of a tail pipe 120 inserts the edge of the opening 124 among the shrouds 230 and 240 of ******, and is installed. Between the rim of opening 124, and the front face 231 of a shroud 230,240, the clearance 13 where cooling air 400 blows off is secured. This clearance 13 is uniformly formed in the periphery of opening 124 rim.
[0027] Moreover, the seal supporter 123 is installed in the periphery of the tail pipe 120 outlet section 122. The closure of the tail pipe 120 outlet section 122 and the combustion path 210 is carried out by the seal member 125 passed and installed in these seal supporter 123 and shrouds 230 and 240. This seal member 125 has the tubed part 14 which has an abbreviation similarity configuration as the periphery of the tail pipe 120 outlet section 122. It is inserted in the outlet section 122 of a tail pipe 120, the seal member 125 making the inner skin of this tubed part 14 counter the peripheral face of the tail pipe 120 outlet section 122. The space 9 which the inner skin of a tubed part 14 and the peripheral face of a tail pipe 120 counter and form serves as the air duct 9 to which cooling air 400 performs convection-current cooling in the peripheral face of the tail pipe 120 outlet section 122.
[0028] The air chamber 1 is formed in the upstream of the seal supporter 123. This air chamber 1 is formed of the peripheral face of a tail pipe 120, the upstream side face 2 of the seal supporter 123, the wall 3, and the in PINJI ring 4. The seal supporter 123 is opening the air chamber 1 and the air duct 9 for free passage mutually by the slit 12 which it has in a welding side with a tail pipe 120. Moreover, the in PINJI ring 4 has the in PINJI hole 6 of a large number which spout cooling air 400, makes the field counter with the peripheral face of a tail pipe 120, and is installed.
[0029] In the gestalt 2 of this operation, by the differential pressure of the tail pipe 120 exterior and the combustion path 210, the cooling air 400 compressed with the compressor blows off from the in PINJI hole 6 in an air chamber 1, and collides with the peripheral face of the tail pipe 120 outlet section 122. Thereby, in PINJI cooling of the outlet section 122 is carried out. Moreover, the cooling air 400 after in PINJI cooling collects in an air chamber 1, passes along the slit 12 of the seal supporter 123, and flows into an air duct 9. And cooling air 400 flows an air duct 9 along with the peripheral face of the tail pipe 120 outlet section 122, and carries out convection-current cooling of this outlet section 122. At this time, the seal member 125 acts as a wall surface of the air duct 9 which draws this cooling air 400. Furthermore, the cooling air 400 after convection-current cooling blows off from the clearance 13 between the rim of tail pipe 120 opening 124, and shrouds 230 and 240 along the front face of shrouds 230 and 240 (refer to drawing 7). Thereby, the film of cooling air 400 is formed in a shroud 230 and 240 front faces, and shrouds 230 and 240 are protected from the hot combustion gas 300 which blows off from tail pipe 120 opening 124.
[0030] According to the gestalt 2 of this operation, since the outlet section 122 of a tail

pipe 120 is cooled by above-mentioned in PINJI cooling and above-mentioned convection-current cooling, that burning and heat deformation are controlled. Moreover, since film cooling of the inside shroud 230 and the outside shroud 240 of the 1 step of turbine stationary blade 220 is carried out by the cooling air 400 which blows off from a clearance 13, the burning is controlled. Moreover, since the cooling air 400 after in PINJI cooling is used for convection-current cooling through an air chamber 1, it can cool the tail pipe 120 outlet section 122 efficiently by little cooling air 400. Moreover, since the cooling air 400 which cooled the outlet section 124 is further used for cooling of the inside shroud 230 and the outside shroud 240, cooling air 400 is utilized efficiently and it can be effectively cooled by the small flow rate.

[0031] (Modification) Drawing 8 is the side-face sectional view showing the modification of the gas turbine combustor 100 indicated in the gestalt 2 of operation. In this drawing, the same sign is given to the same component as the gas turbine combustor 100 indicated in the gestalt 2 of the above-mentioned implementation, and the explanation is omitted. With this configuration, the in PINJI ring 4 which the gas turbine combustor 100 of the gestalt 2 of operation has, the air chamber 1, and the slit 12 are not formed. Moreover, in this configuration, the seal member 125 which closes the tail pipe 120 outlet section 122 and the turbine combustion path 210 has many in PINJI holes 6 in that tubed part 14 (refer to drawing 9). The in PINJI hole 6 is uniformly formed in the tubed part 14 perimeter of the seal member 125, and has turned the jet direction to the peripheral face of the tail pipe 120 outlet section 122.

[0032] In this configuration, the cooling air 400 compressed with the compressor blows off and collides with the peripheral face of the tail pipe 120 outlet section 122 from the in PINJI hole 6 of the seal member 125, and carries out in PINJI cooling of the outlet section 122. And convection-current cooling of the peripheral face of the outlet section 122 is carried out through the air duct 9 formed of the seal member 125 and the peripheral face of the tail pipe 120 outlet section 122. Furthermore, from the clearance between the rim of tail pipe 120 opening 124, and shrouds 230 and 240, the cooling air 400 after convection-current cooling blows off along with the wall surface of shrouds 230 and 240, and forms the film of cooling air 400 on this wall surface. Thereby, film cooling of the inside shroud 230 and the outside shroud 240 of a turbine is carried out.

[0033] According to this configuration, since the tail pipe 120 outlet section 122 is cooled by the above-mentioned in PINJI cooling and convection-current cooling, that burning and heat deformation are inhibited. Moreover, since the in PINJI hole 6 was formed in the seal member 125, nearby heat deformation can cool the opening 124 remarkable neighborhood effectively especially in the tail pipe 120 outlet section 122. Moreover, in this configuration, since the cooling air 400 after in PINJI cooling is used for convection-current cooling of the tail pipe 120 outlet section 122 and is further used for film cooling of the shrouds 230 and 240 of a turbine, cooling air 400 is utilized efficiently and it can be effectively cooled by the small flow rate. Moreover, since formation of the air chamber 1 indicated in the gestalten 1 and 2 of the above-mentioned implementation is not required, the outlet section 122 can be cooled with a simpler configuration.

[0034]

[Effect of the Invention] According to the gas turbine combustor (claim 1) which is this invention, as explained above, since it is used for both in PINJI cooling and film cooling in cooling of a combustor outlet, even if cooling air is little cooling air, it can be cooled

effectively, and burning and heat deformation of a combustor outlet can inhibit it effectively.
[0035] Moreover, according to the gas turbine combustor (claim 2) which is this invention, since it is used for both in PINJI cooling and convection-current cooling in cooling of a combustor outlet, even if cooling air is little cooling air, it can be cooled effectively, and burning and heat deformation of a combustor outlet can inhibit it effectively.
[0036] Moreover, since cooling air cools the wall of a combustor outlet from both sides by film cooling and convection-current cooling according to the gas turbine combustor (claim 3) which is this invention, a combustor outlet is cooled effectively and that burning and heat deformation are inhibited effectively.
[0037] Moreover, according to the gas turbine combustor (claim 4) which is this invention, since it is cooled by in PINJI cooling, film cooling, and convection-current cooling, a combustor outlet can cool a combustor outlet more effectively as compared with the case where it cools only with in PINJI cooling and film cooling. Moreover, according to the gas turbine combustor (claim 5) which is this invention, in PINJI cooling of the combustor outlet is carried out, and that burning and heat deformation are inhibited.
[0038] Moreover, according to the gas turbine combustor (claim 6) which is this invention, further, since it is used for film cooling of a combustion path, even if the cooling air after convection-current cooling is little cooling air, it can be cooled effectively, and burning and heat deformation of a combustor outlet can inhibit it effectively.
[0039] Moreover, according to the gas turbine combustor (claim 7) which is this invention, since it supplies as a refrigerant which accumulates the cooling air after in PINJI cooling, and is used for the following cooling step, an air chamber can utilize little cooling air effectively, and can raise cooling effectiveness.
[0040] Moreover, according to the gas turbine combustor (claim 8) which is this invention, cooling air blows off from that opening outside edge to a combustion path, after carrying out convection-current cooling of the combustor outlet. Therefore, cooling air can be combined with cooling of a combustor outlet, and can be used also for burning near an opening rim, or cooling of a 1 step of turbine stationary blade, and the efficient use of a refrigerant of it is attained.
[0041] Moreover, according to the gas turbine combustor (claim 9) which is this invention, since it is formed in the seal member which closes a combustor outlet and a turbine combustion path, an in PINJI hole becomes possible [carrying out in PINJI cooling to the periphery wall surface near opening of a combustor outlet], and can cool near [remarkable] opening of burning effectively.

[Brief Description of the Drawings]
[Drawing 1] It is the side-face sectional view showing the gas turbine combustor concerning this invention which is the gestalt of the 1st operation.
[Drawing 2] It is the in PINJI hole of an in PINJI ring.
[Drawing 3] It is the film cooling hole of a tail pipe.
[Drawing 4] It is opening of a tail pipe.
[Drawing 5] It is the modification of the gas turbine combustor shown in drawing 1 .

[Drawing 6]It is the side-face sectional view showing the gas turbine combustor concerning this invention which is the gestalt of the 2nd operation.
[Drawing 7] It is an expanded sectional view near [which was shown in drawing 2] combustor opening.
[Drawing 8] It is the side-face sectional view showing the modification of the gas turbine combustor shown in drawing 2 .
[Drawing 9] It is a seal member.
[Drawing 10] It is the conventional gas turbine combustor whole block diagram.
[Drawing 11] It is the perspective view of a tail pipe.
[Drawing 12] It is an expanded sectional view near the outlet section of a tail pipe.
[Drawing 13] It is opening of a tail pipe.
[Description of Notations]
1 Air Chamber
4 In PINJI Ring
6 In PINJI Hole
8 Film Cooling Hole
9 Air Duct
12 Slit
13 Clearance
14 Tubed Part of Seal Member
15 Covering Member

CLAIMS

[Claim(s)]
[Claim 1] While being prepared in the combustion path of a turbine at the periphery of the combustor outlet which blows off combustion gas While being prepared in an in PINJI cooling means to have two or more in PINJI holes which it blows off [holes] on the periphery wall surface of said combustor outlet, and make the cooling air compressed with the compressor collide with it, and the wall of said combustor outlet The gas turbine combustor characterized by including a film-cooling means to have two or more film cooling holes which incorporate the cooling air after said in PINJI cooling inside said combustor outlet, blow off, and form the film of cooling air on the inner circle wall side of said combustor outlet.
[Claim 2] While being prepared in the combustion path of a turbine at the periphery of the combustor outlet which blows off combustion gas While being formed in an in PINJI cooling means to have two or more in PINJI holes which it blows off [holes] on the periphery wall surface of said combustor outlet, and make the cooling air compressed with the compressor collide with it, and the periphery of said combustor outlet The gas turbine combustor characterized by including a convection-current cooling means to pass the cooling air after said in PINJI cooling along with the periphery wall surface of said combustor outlet, and to perform convection-current cooling.
[Claim 3] While being formed in the combustion path of a turbine at the periphery of the combustor outlet which blows off combustion gas While being prepared in a convection-current cooling means to pass the cooling air compressed with the compressor along with the periphery wall surface of said combustor outlet, and to perform convection-current

cooling, and the wall of said combustor outlet The gas turbine combustor characterized by including a film-cooling means to have two or more film cooling holes which incorporate the cooling air which flows along with the periphery wall surface of said combustor outlet inside said combustor outlet, blow off, and form the film of cooling air on the inner circle wall side of said combustor outlet.

[Claim 4] Furthermore, the gas turbine combustor according to claim 1 characterized by including a convection-current cooling means to pass the cooling air after said in PINJI cooling along with the periphery wall surface of said combustor outlet, and to perform convection-current cooling while being formed in the periphery of said combustor outlet.

[Claim 5] Said in PINJI cooling means is the gas turbine combustor of any one publication of claim 1-4 characterized by being the in PINJI member which has said in PINJI hole while being installed in the periphery of said combustor outlet.

[Claim 6] Furthermore, the gas turbine combustor of any one publication of claim 1-5 characterized by having the air film means forming which blows off from the clearance in which the air after said in PINJI cooling or the air after said convection-current cooling was formed on the opening outside edge of said combustor outlet, in accordance with the wall of said combustion path, and can form the film of cooling air in the front face of this wall.

[Claim 7] The gas turbine combustor of any one publication of claim 1-6 characterized by preparing the air chamber which supplies this accumulated cooling air to said film cooling hole or said cooling air passage while accumulating the cooling air which blew off from said in PINJI hole, and collided with said periphery wall surface in the periphery of said combustor outlet.

[Claim 8] Said convection-current cooling means is the gas turbine combustor of any one publication of claim 1-7 characterized by being the covering member which forms the path of said cooling air on the peripheral face of said combustor outlet, forming a clearance in the opening outside edge of said combustor outlet while covering the periphery of said combustor outlet and being installed.

[Claim 9] Furthermore, the gas turbine combustor of any one publication of claim 1-8 characterized by including the seal member which closes the clearance between said combustion paths and said combustor outlets while being passed and installed in the inlet port of said combustion path from said combustor outlet, having two or more in PINJI holes which it blows off [holes] on the periphery wall surface near opening of said combustor outlet, and make said cooling air collide with it, and covering the periphery of said combustor outlet.